Servo Web Rendering Engine Reboot

The **embeddable**, **independent**, **memory-safe**, **modular**, **parallel** web rendering engine

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About me

- **Igalia** Web Platform Team
- **Web engines hacker** with experience in Chromium/Blink and Safari/WebKit
- **CSS Working Group** member since 2017
- **Servo** Technical Steering Committee (TSC) chair

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About Igalia

- **Open Source Consultancy** founded in 2001
- 140 people, fully remote (25 countires)
- **Flat structure** (cooperative like model)
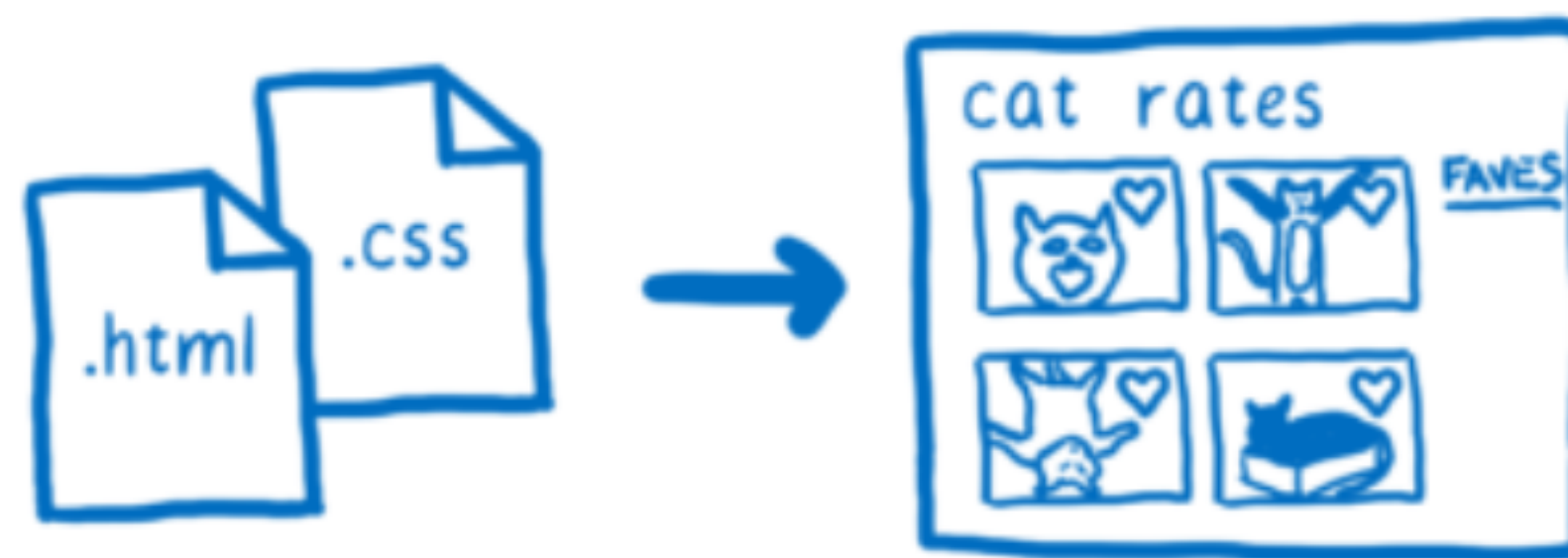- Top contributors to **Chromium, WebKit and Gecko**

What's Servo?

What's Servo?

Servo is
a **web rendering engine**
written in **Rust**,
with **WebGL** and **WebGPU** support,
and adaptable to **desktop**, **mobile**,
and **embedded** applications.

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Web Rendering Engine

Picture by Lin Clark

https://hacks.mozilla.org/2017/08/inside-a-super-fast-css-engine-quantum-css-aka-stylo/

Rendering Engine Main Phases

- Parsing: DOM Tree
- Style
- Layout: Layout Tree
- Painting
- Compositing

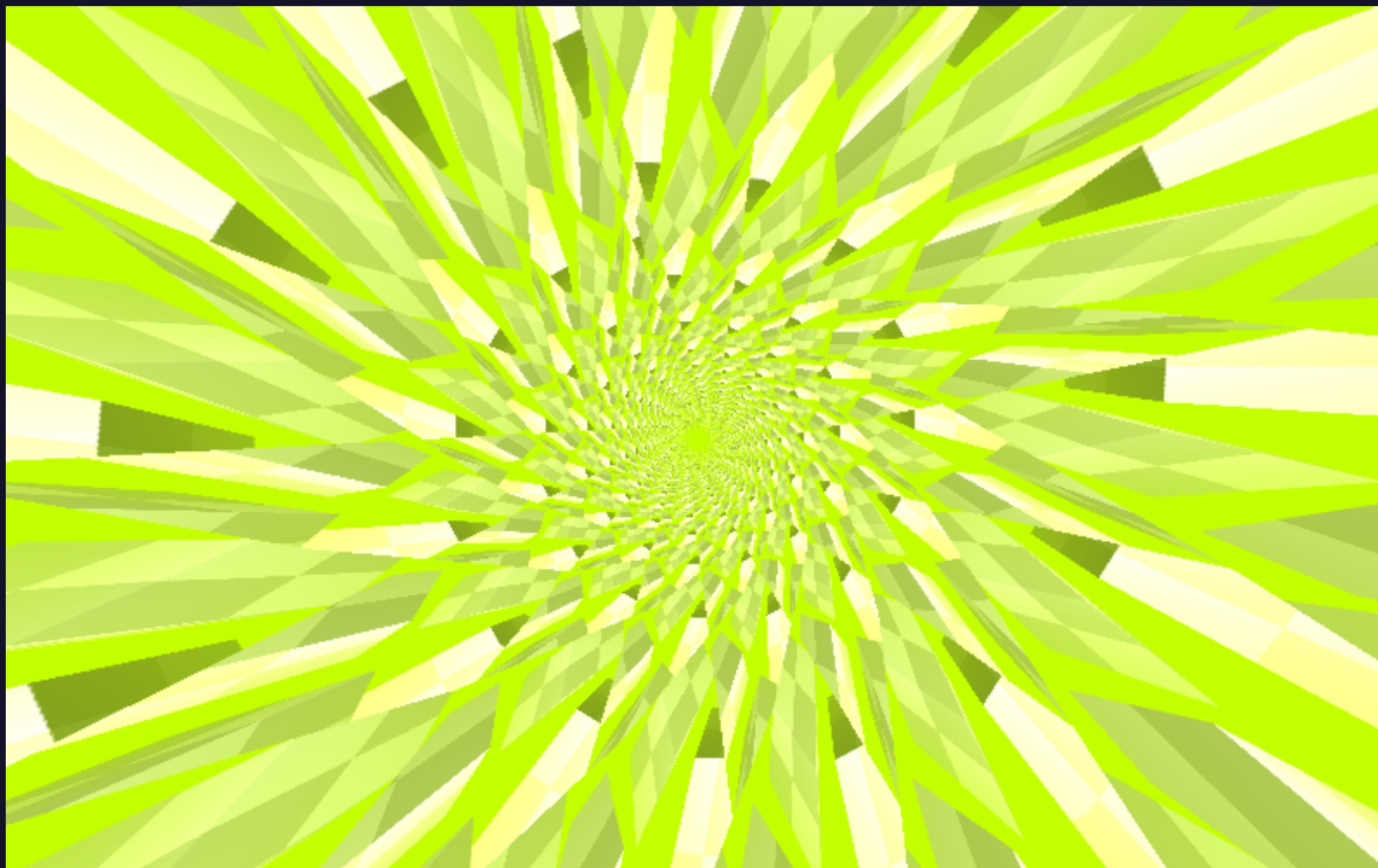# Rust Programming Language

- **Memory safety**: Fewer vulnerabilities
- **Concurrency**: Faster & more energy-efficient

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WebGL

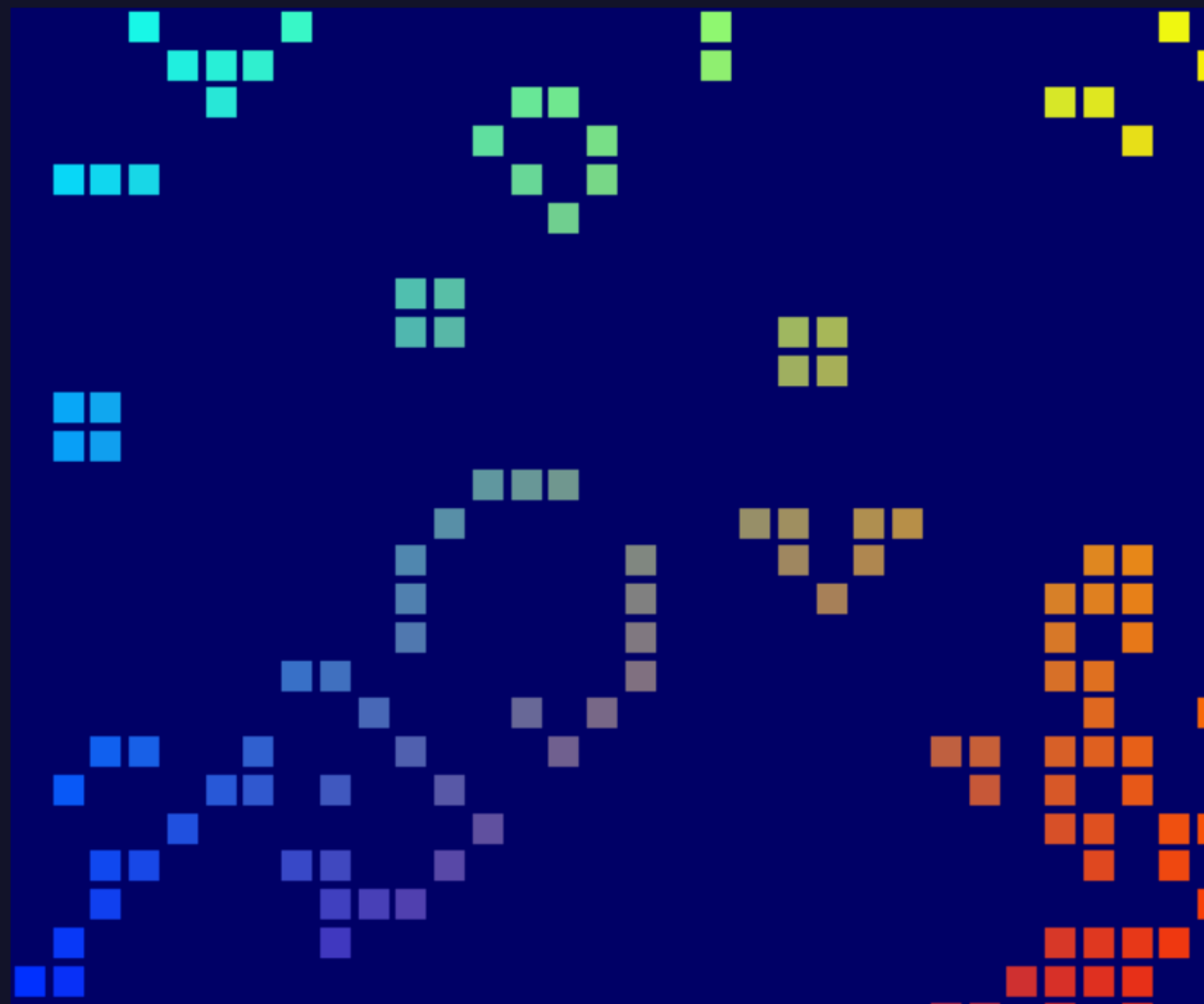WebGL is a JavaScript API for rendering interactive 2D and 3D graphics.

WebGL

WebGPU

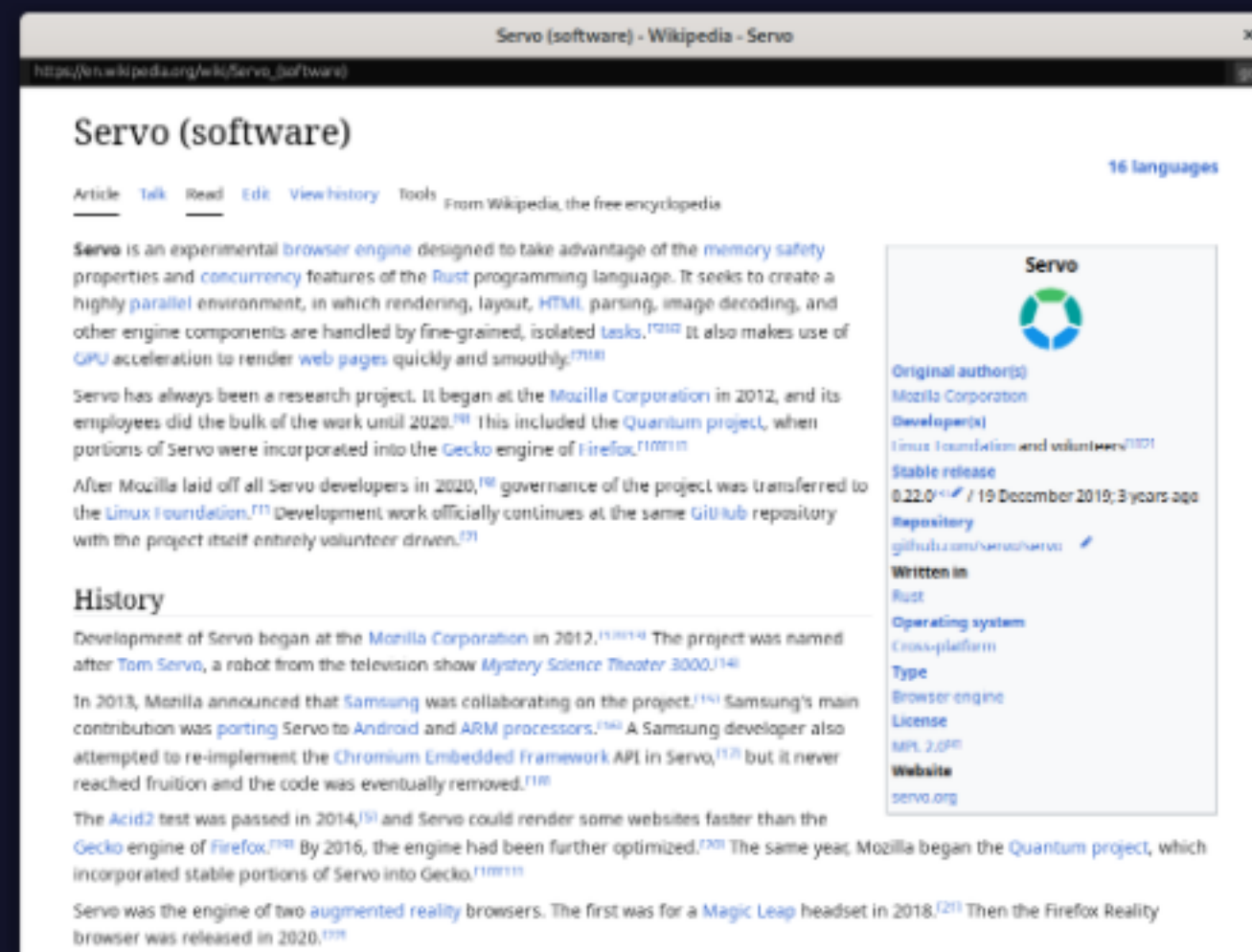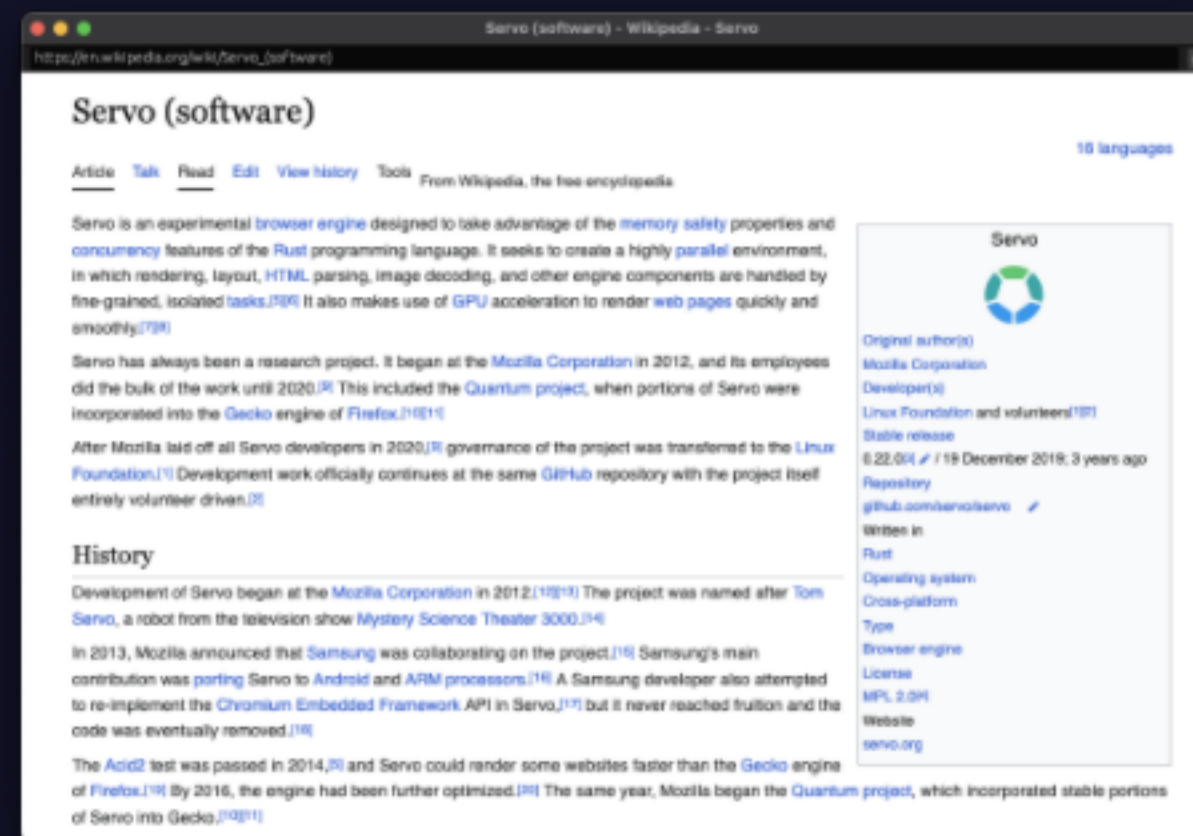WebGPU is the successor to WebGL providing modern 3D graphics and computation capabilities.
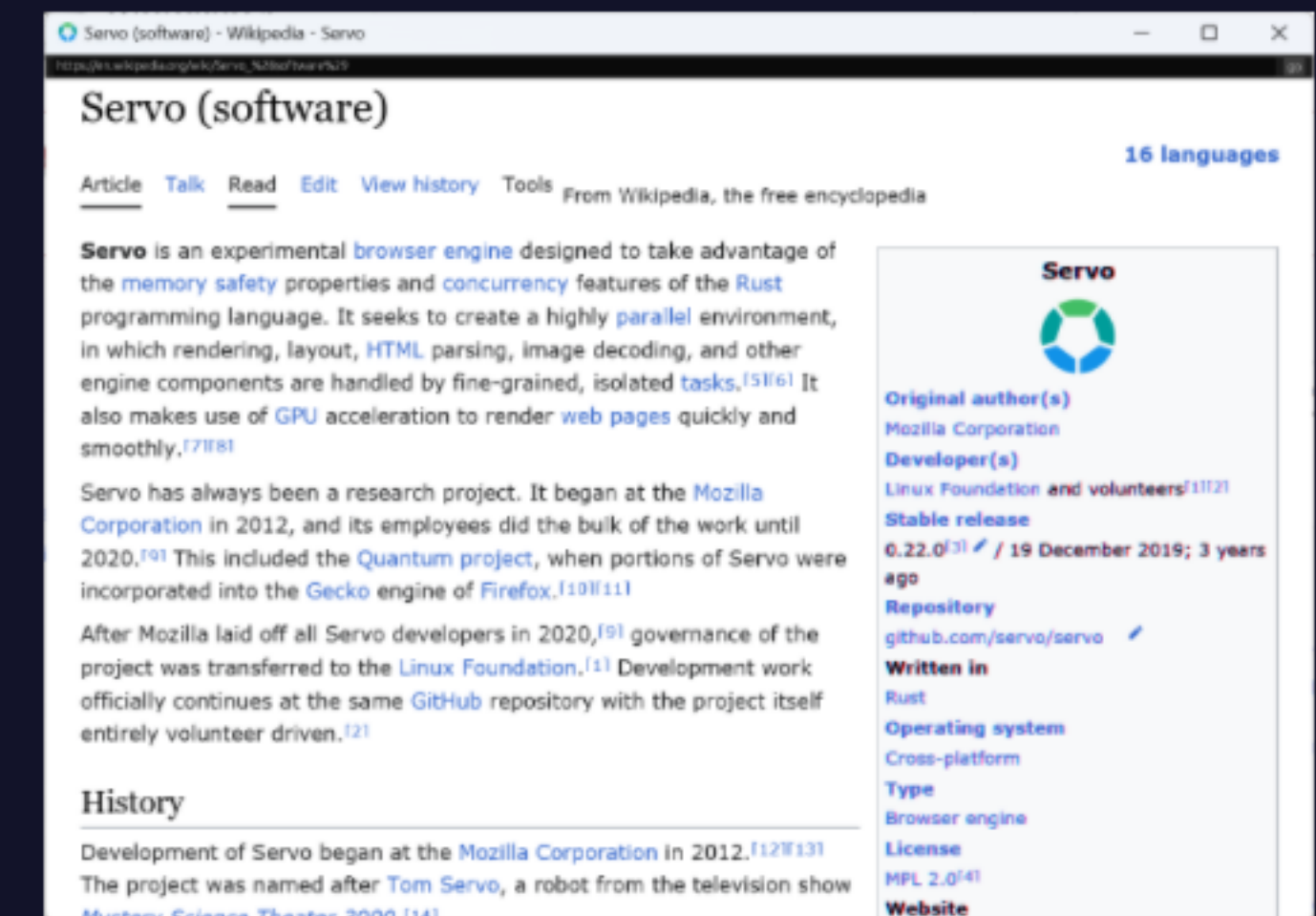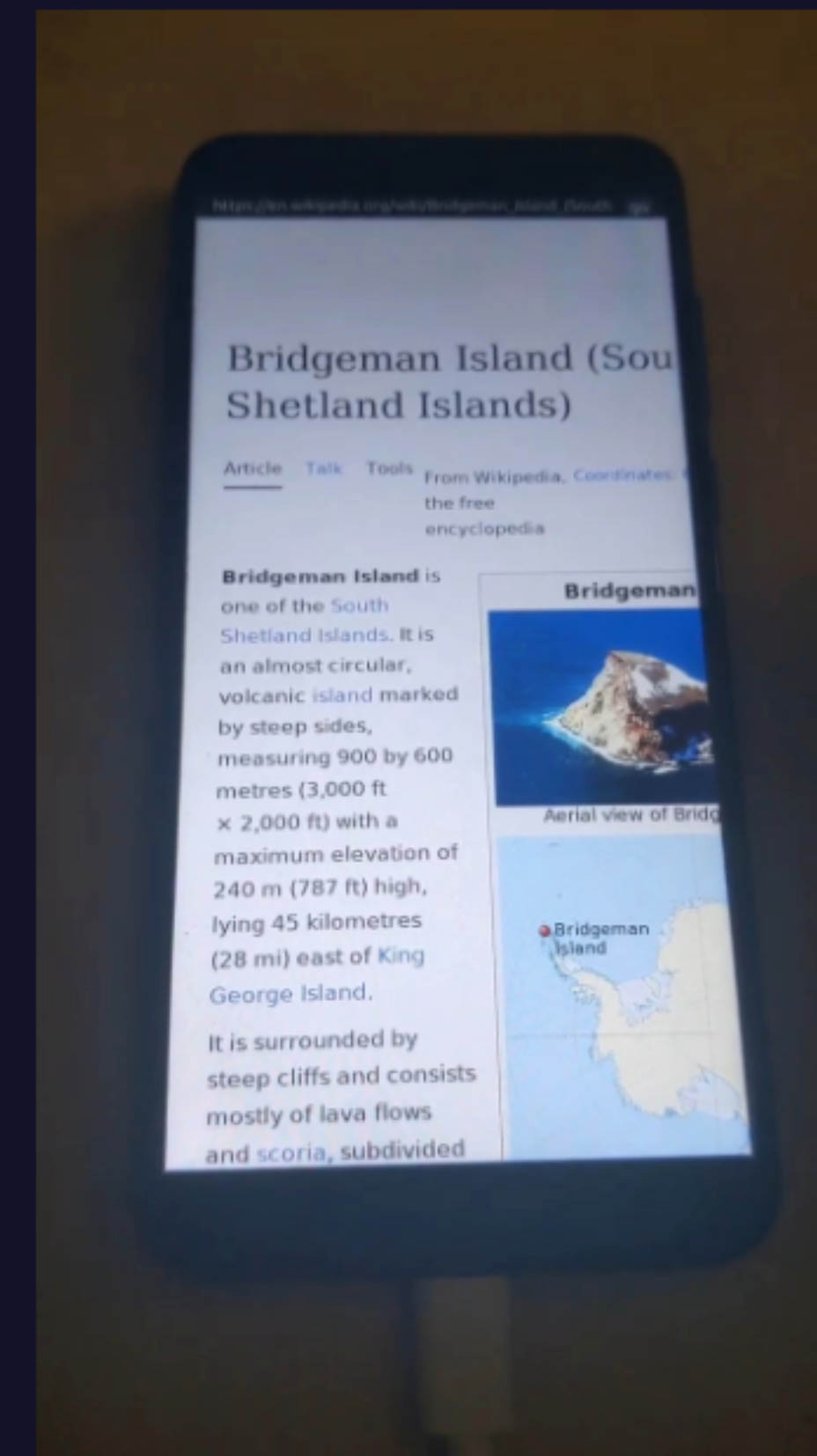
WebGPU

Desktop

Linux

MacOS

Windows

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Mobile   Android & Linux (PinePhone Pro)

PinePhone Pro screenshot by Capyloon
https://floss.social/@capyloon@fosstodon.org/111032248649111871
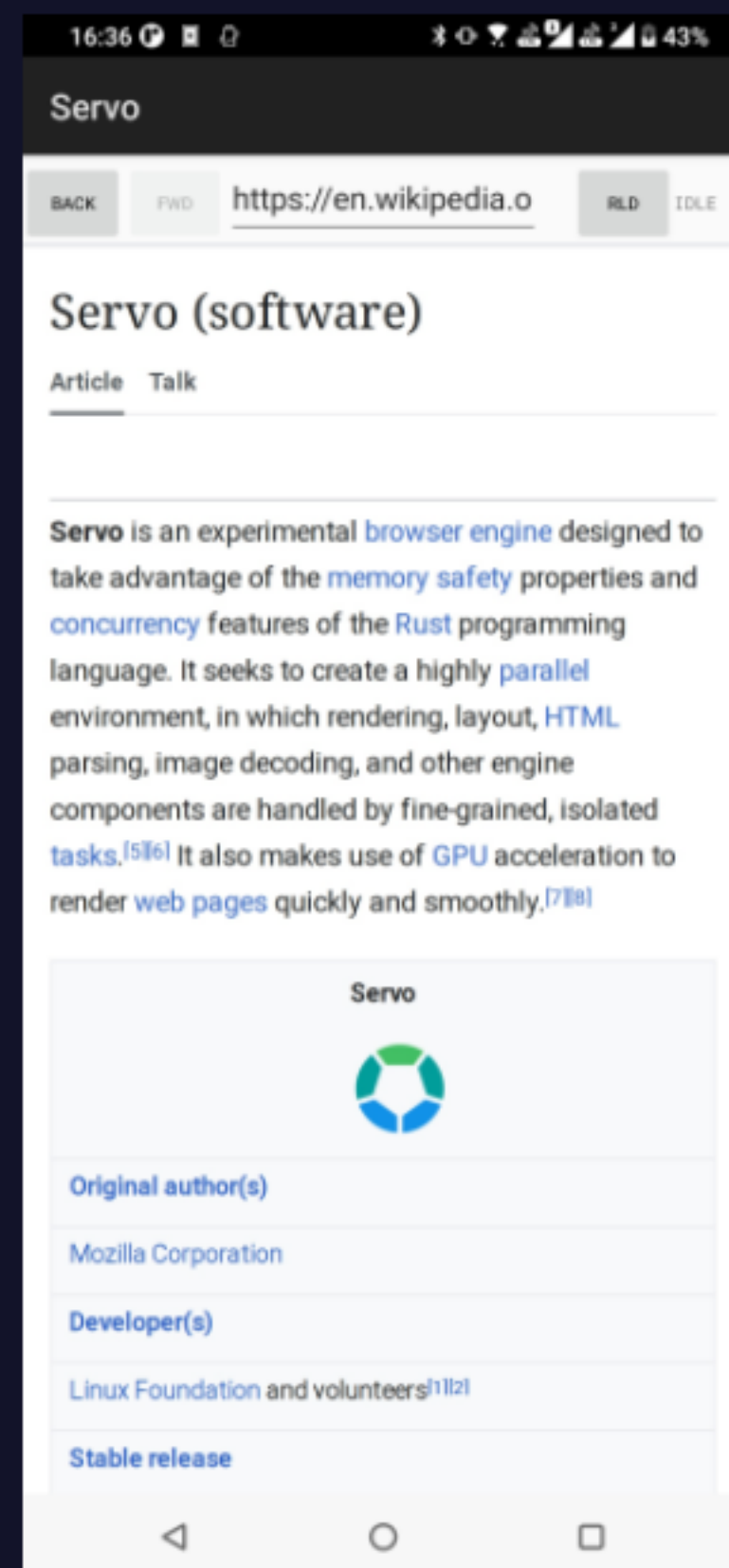
Embedded applications

UI frameworks

Other applications

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What's not Servo right now?

- A production ready rendering engine.
Servo is **experimental**
- An engine to browse the general web.
Servo can render a **controlled environment**

Features

- **Embeddable**
- **Independent**
- **Memory-safe**
- **Modular**
- **Parallel**

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Embeddable

- Applications can use Servo to render **web content**
- Servo is working on providing a good **API for embedders** (a webview library)
- Servo works on **embedded devices** (e.g. Raspberry Pi)

Independent

- 2012-2020: Mozilla Research
- 2020-2023: Linux Foundation
- 2023-: **Linux Foundation Europe**

Memory-safe

- **Rust** programming language
- Borrow checker and ownership system
- Built-in safe concurrent data structures
- **Eliminate vulnerabilities** related to **memory** (e.g. *use-after-free*) and **concurrency** (e.g. data races)

Modular

- Several Servo modules have become popular in the **Rust ecosystem**
- **Firefox** uses some modules (e.g. html5ever, rust-cssparser, Stylo, WebRender)

Parallel

- Devices have **multiple cores** in both CPU and GPU
- Servo uses parallelism to provide **faster and more energy-efficient** rendering
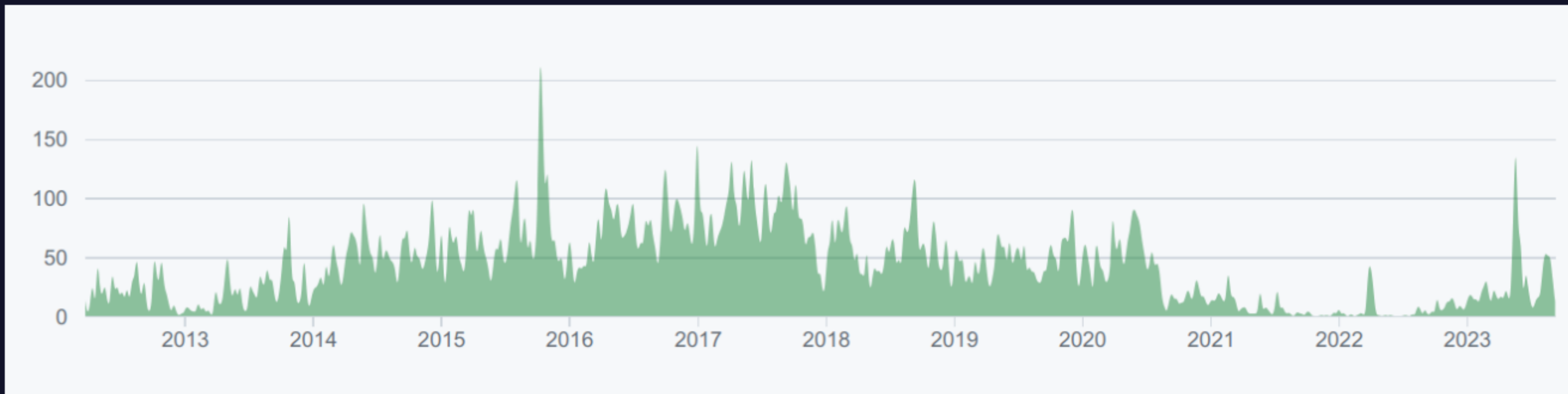- **Rust** programming language makes easier to implement concurrency

Status

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2023 Roadmap

Q1	Q2	Q3	Q4
Project reactivation			
Project outreach			
Main dependencies upgrade			
Layout engine selection			
		Progress towards basic CSS2 support	
		Explore Android support	
			Embeddable web engine experiments

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Project reactivation

- 1682 commits (523 in 2022)
- 77 committers (22 in 2022)
- Monthly TSC meetings

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Project outreach

- **Blog posts** with updates around the project: https://servo.org/blog/
- **Events**: RustNL, Web Engines Hackfest, Embedded Open Source Summit, W3C TPAC, Linux Foundation Europe Member Summit, Open Source Summit Europe, GOSIM

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Main dependencies upgrade

- **WebRender** has been upgraded to mid 2021
- **Stylo** upgrade is at ~50% (landing in batches)
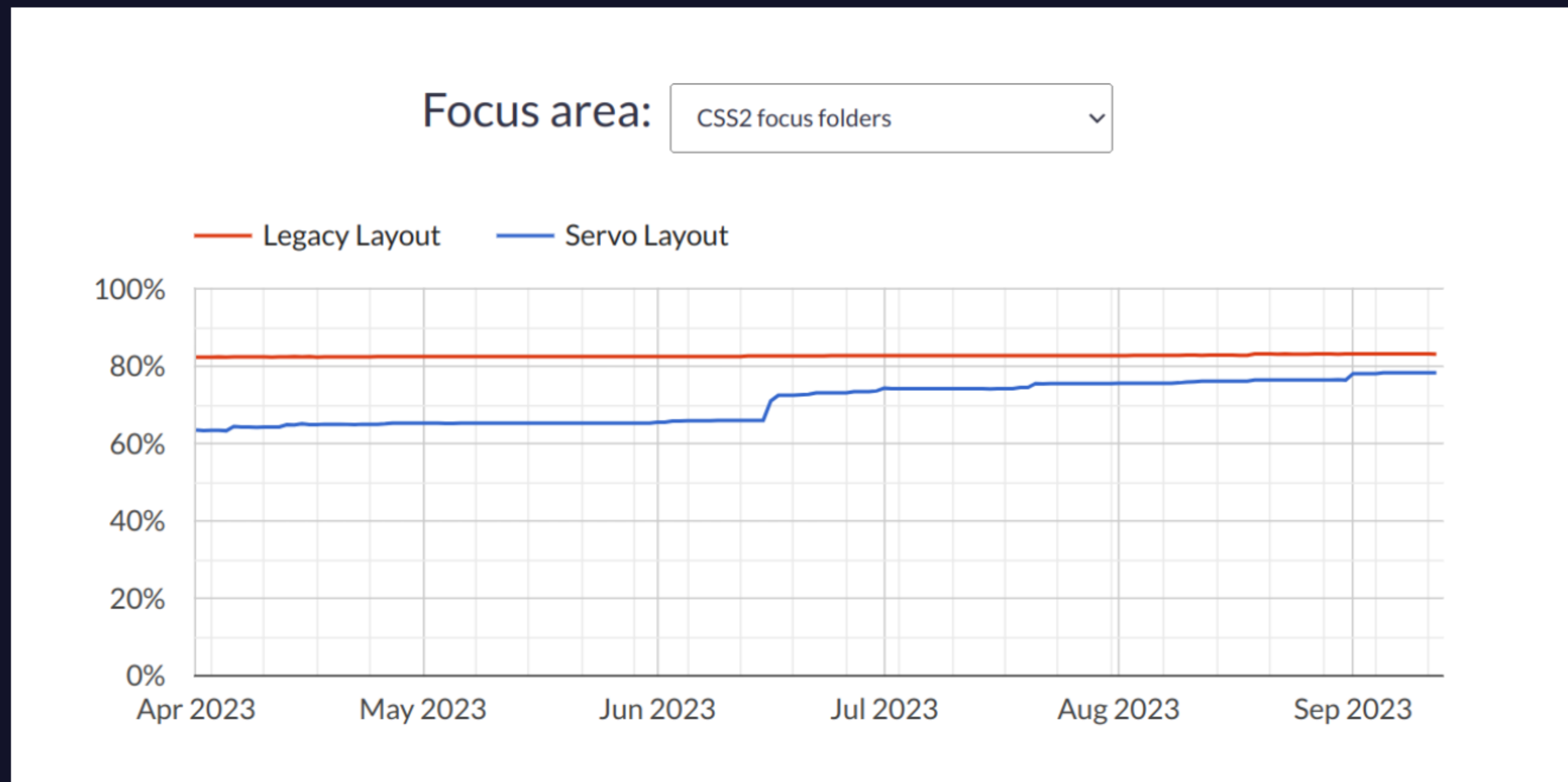- **SpiderMonkey** hasn't been upgraded yet

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Layout engine selection

- Servo has **two layout engines**, the original one (called legacy) and the new one (started in 2020)
- **Servo Layout Engines Report**
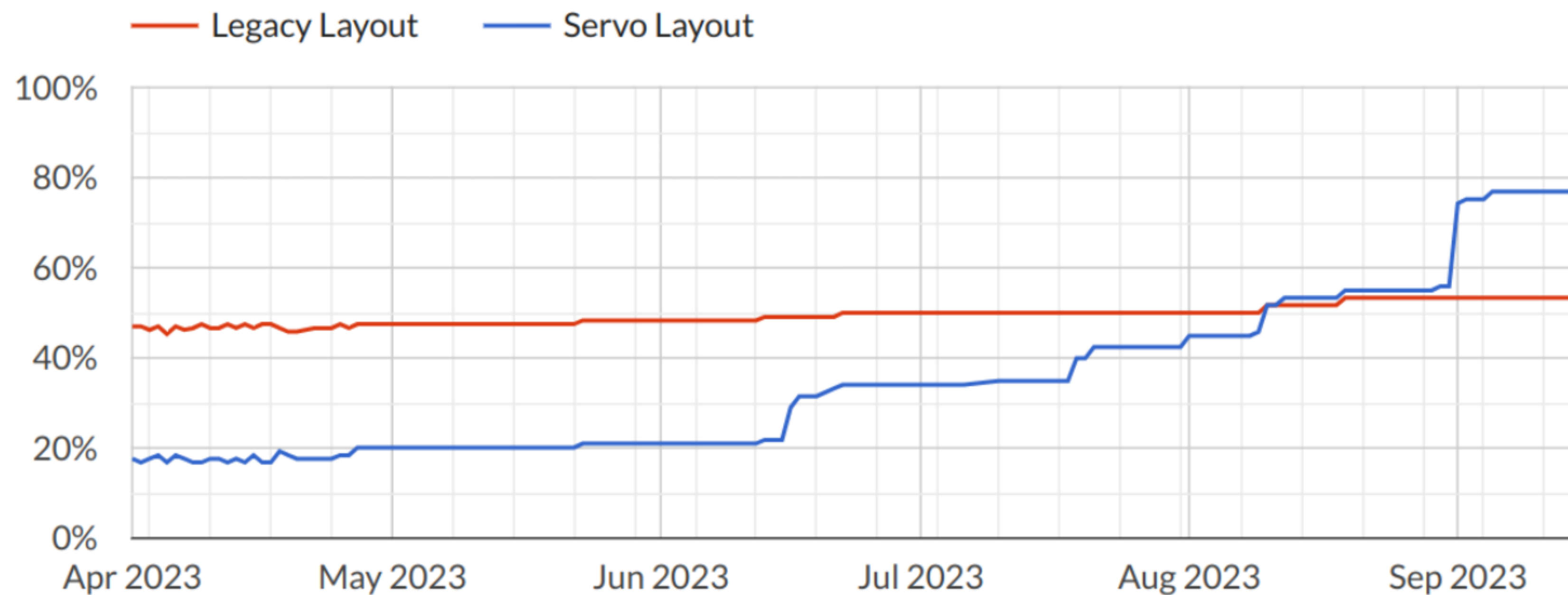- Proposal to move forward with the **new layout engine**
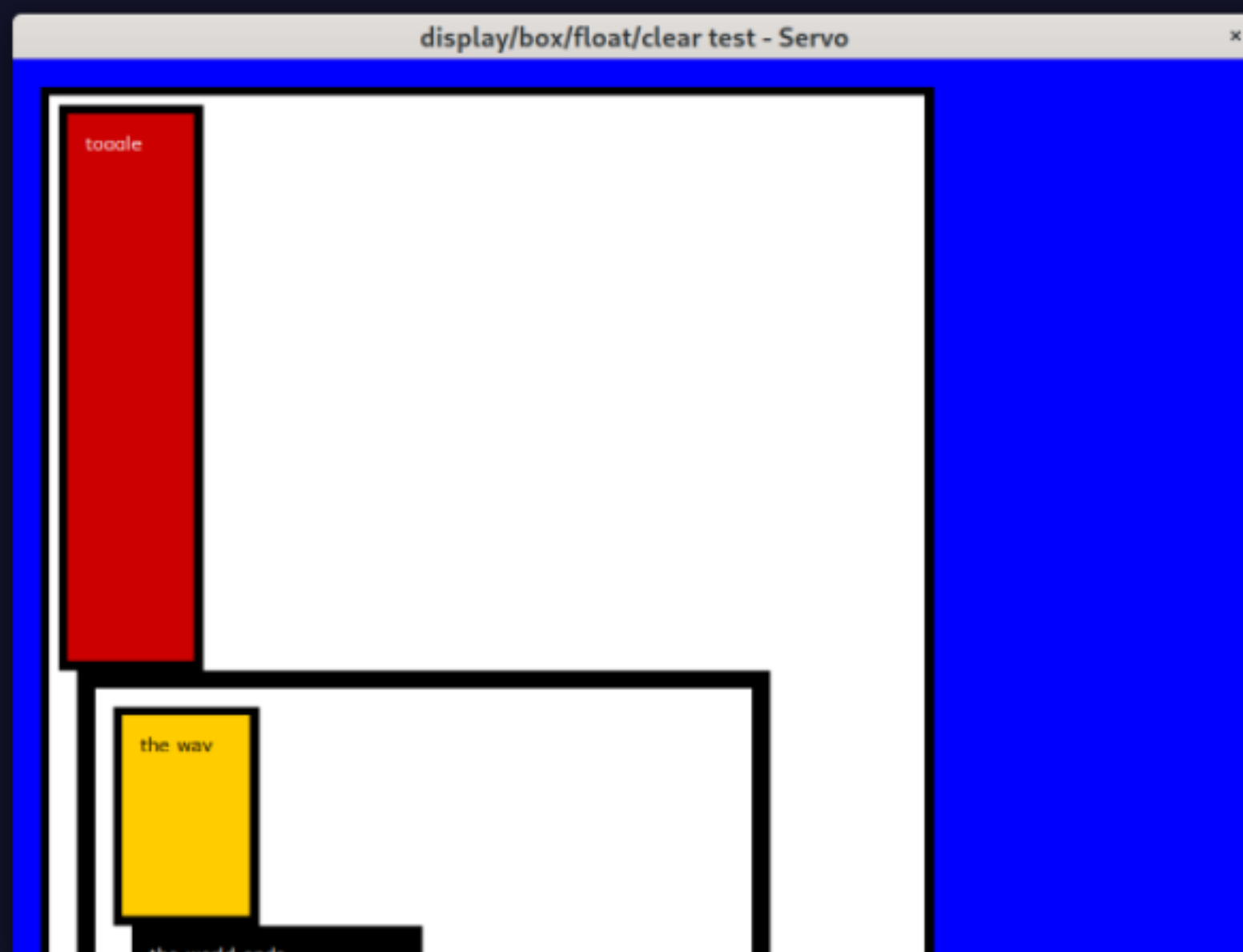
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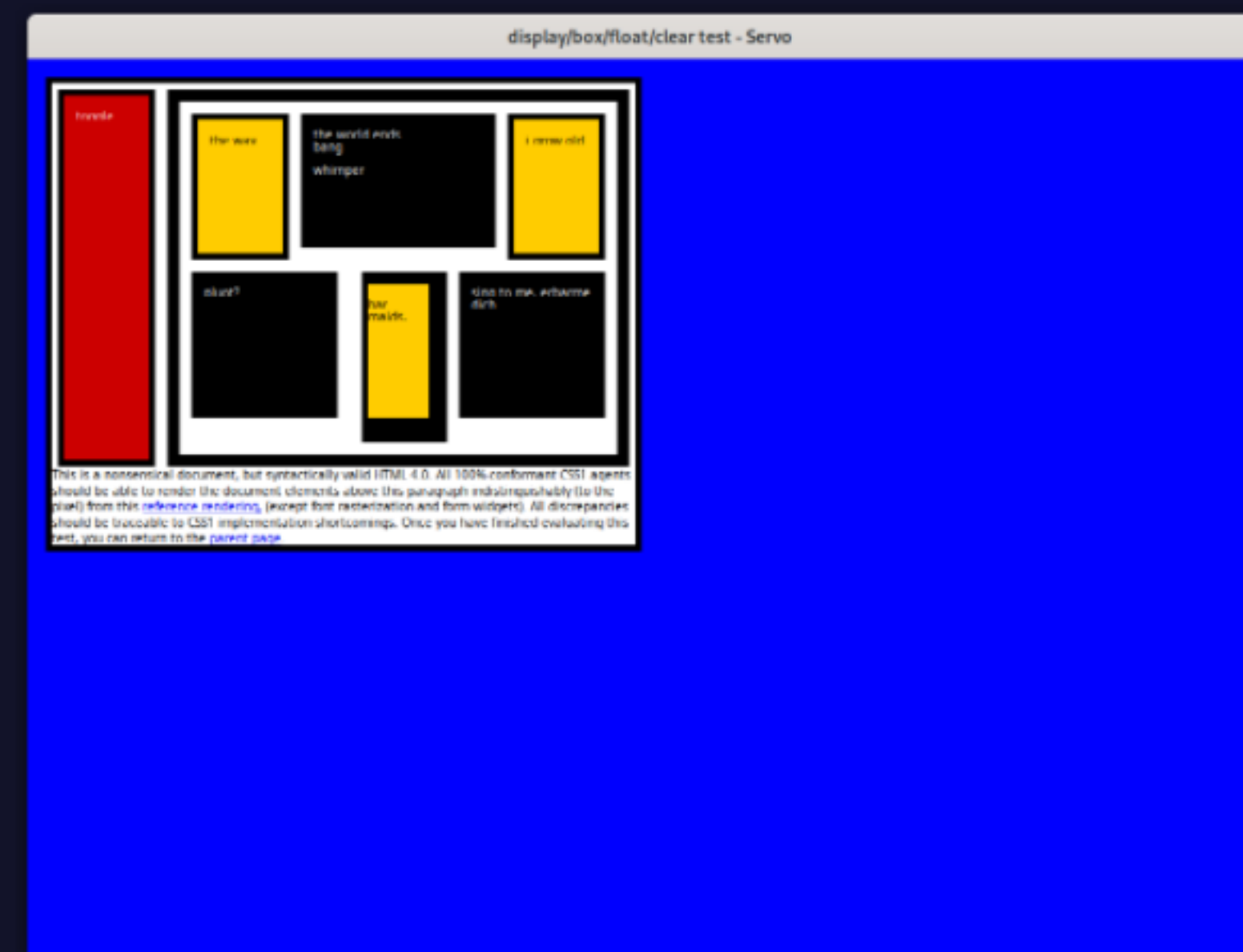# Progress towards basic CSS2 support

https://wpt.servo.org

CSS floats

Focus area: -- /css/CSS2/floats/

Legacy Layout — Servo Layout

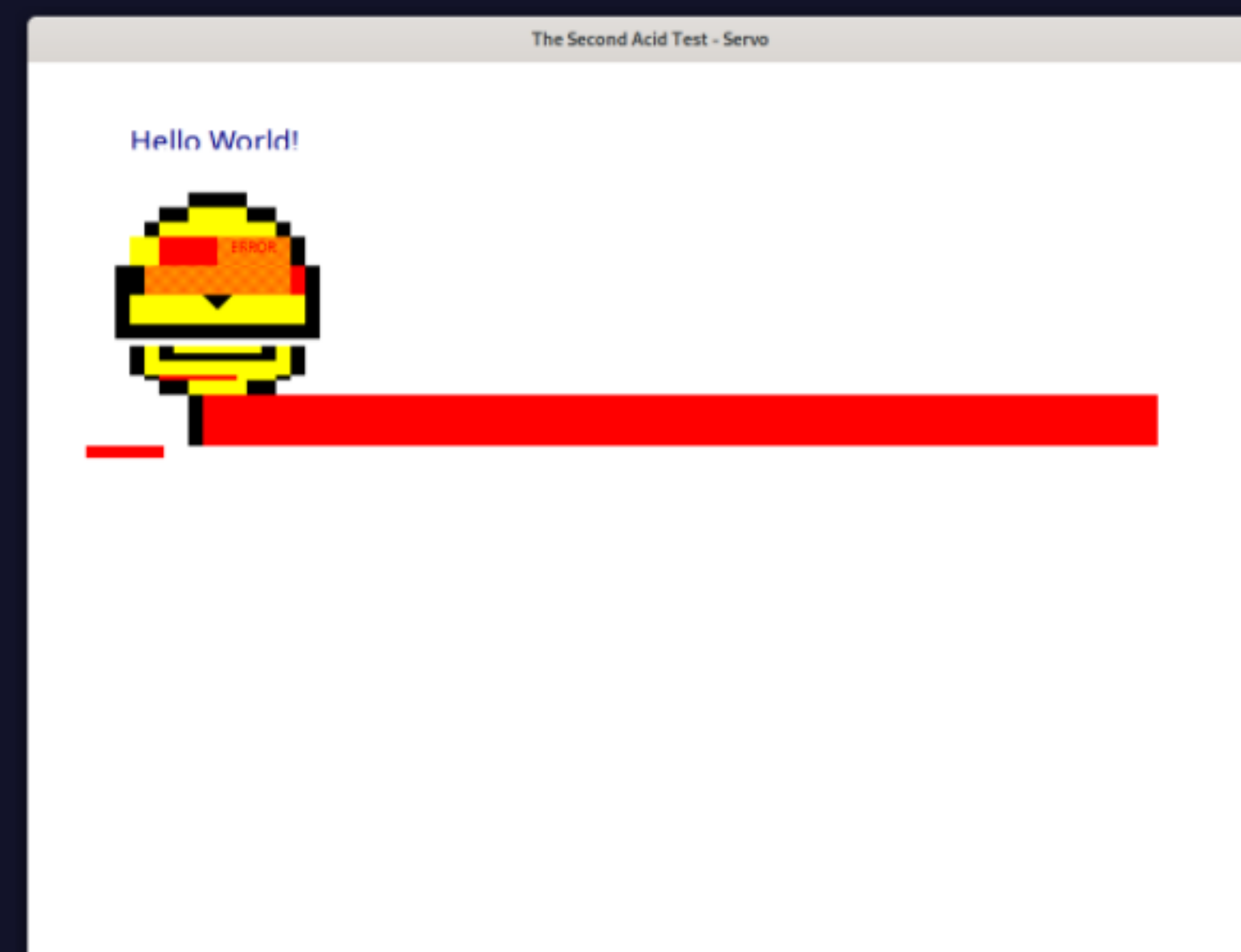https://wpt.servo.org

Acid1 test

January 2023

September 2023

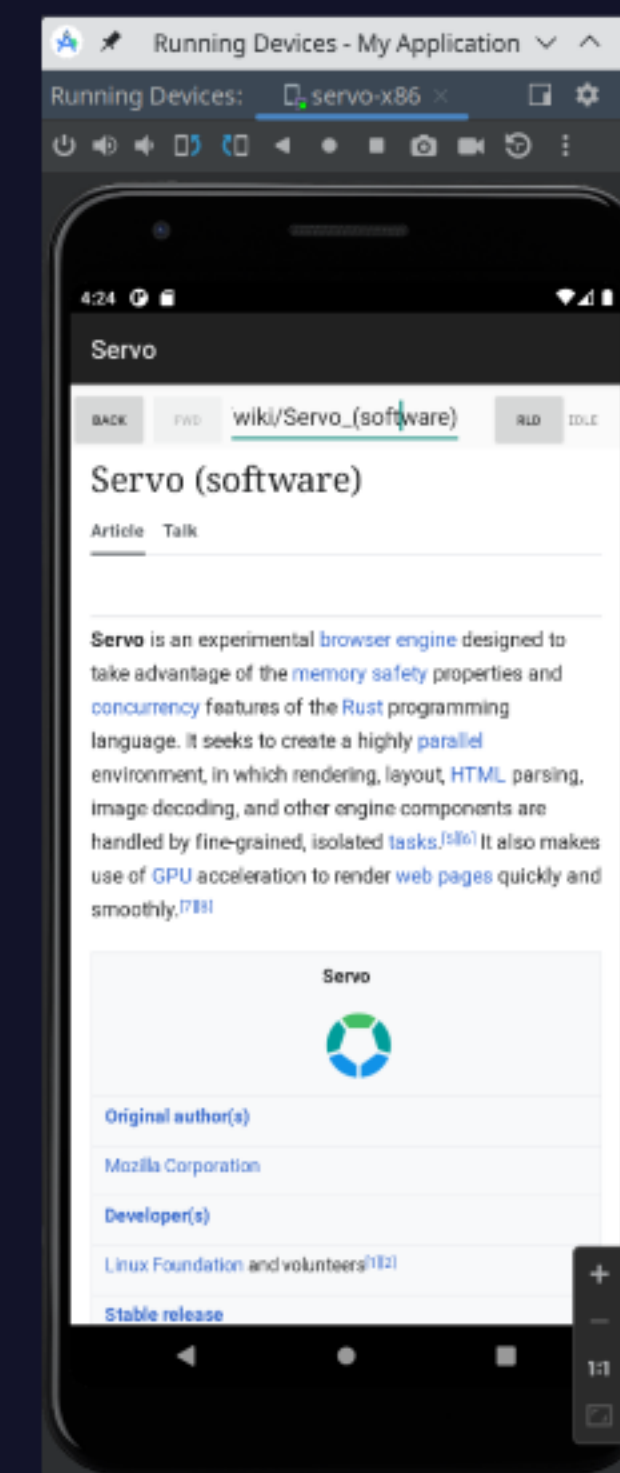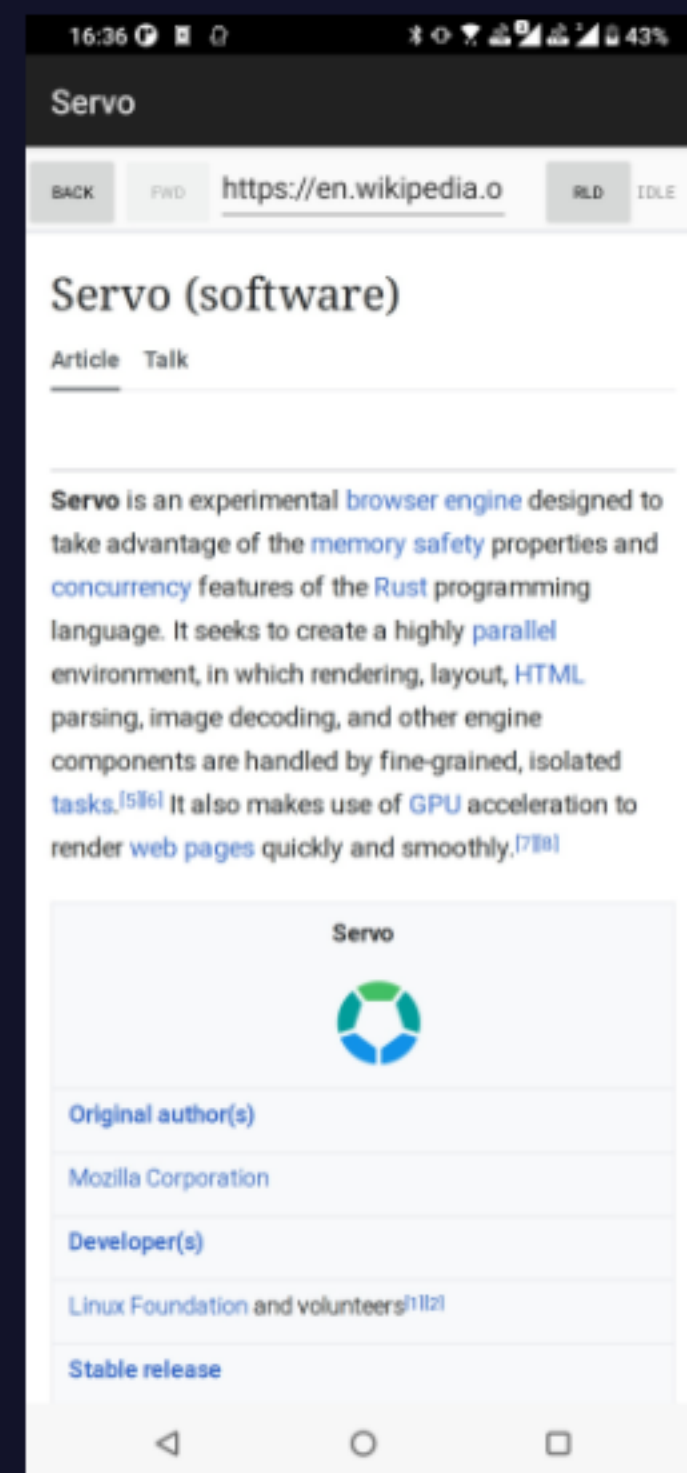# Acid2 test

January 2023

September 2023

Explore Android support

- Experimental **prototype running in Android**

Embeddable web engine experiments

- Servo running on **Raspberry Pi** and **PinePhone Pro**
- Discussions about the **embedding API** design
- More work on the API to come soon

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Other

- **Make easier to contribute to Servo** by simplifying the build, reducing build and CI times, etc.
- Servo **minibrowser** to test it easily (URL bar)
- Bring **WebGPU** support back to life
- **Servo experiments**: https://demo.servo.org/
- ...

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Plans

Embedding API

- Very important task to **start getting applications using Servo**
- **Design** has been agreed in the TSC calls
- Plan to start working on this in **Q4**
- Goal: create some prototype applications using the new API

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More CSS improvements

- Carry on with floats, inline layout, …
- More to come: line-height, vertical-align, tables, writing modes, …
- Identify main **areas of work** to focus **layout efforts in 2024**

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Complete Android support

- So far we have a **first experimental prototype**
- Look into having **proper Android support**
- Applications could also **use Servo in Android**

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And more

- Carry on **maintenance and project outreach**
- **Lots of things to work on**
- Plans to experiment with Servo in **more platforms and boards**
- ...

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Conclusion

Servo is looking great

- **Renewed project activity** has been successful
- **Great progress** during 2023 in many areas
- **New layout engine** is paving the path for more features support and better interoperability
- **Servo is still an experimental** and big project with lots of work everywhere

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Use cases

- **Embedded applications** with web technologies
- Applications that use **WebGL, WebGPU or CSS-based ones**
- Basis for Rust-based **native UI frameworks**

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Join the project

- GitHub: https://github.com/servo
- Chat: servo.zulipchat.com
- Email: join@servo.org

Looking into **growing the community around the project.**

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https://**servo.org**

https://floss.social/**@servo**

https://twitter.com/**ServoDev**

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